Final Sample Solutions

1. (a) $0.5(f(0.5)+f(1)+f(1.5)+f(2)) = 0.5(-0.25+0+0.75+2) = 1.25$

   (b) $\dfrac{2}{3}$

2. $f = c$, $f' = b$, $\int_0^x f(t)dt = a$

3. (a) 37

   (b) -76

   (c) $\dfrac{\sin 1}{3}$

   (d) $\dfrac{1}{2\pi}\sin^2 \pi t + c$

   (e) 5

   (f) $\dfrac{\pi}{16}$

   (g) $\dfrac{\sin^{-1}(x^2)}{2} + c$

   (h) $\dfrac{\ln|x^2+2x|}{2} + c$

4. $F'(x) = \sqrt{1+x^2}$

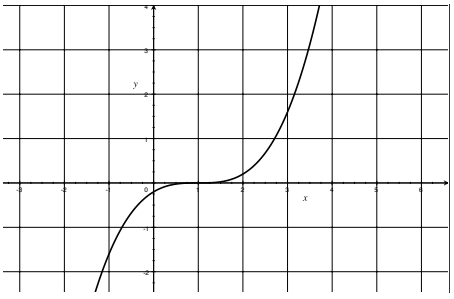
5. (a) $\dfrac{175}{6}$

   (b) $\dfrac{59}{2}$

6. $\dfrac{1-\cos 4}{4}$

7. No, it is not one-to-one. It fails the horizontal line test.

8. (a) $g^{-1}(2) \approx 0.2$

   (b) 

9. $f^{-1}(x) = \dfrac{1-x}{2x-1}$

10. (a) 9

    (b) π

    (c) 2

11. (a) $\sqrt{e+1}$

    (b) $\dfrac{\ln(5^d)}{\ln c}$

12. (a) $\dfrac{1+\ln x}{x \ln x}$

    (b) $\dfrac{1}{2(x^2+1)\sqrt{\tan^{-1} x}}$

    (c) $2(4^{2x}) \ln 4$

    (d) $\dfrac{4}{\sqrt{1-16x^2}}$

13. (a) $200(3.24)^t$

    (b) $\approx 22,040$

    (c) $\approx 25,910$ bacteria/hour

    (d) $\dfrac{\ln 50}{\ln 3.24} \approx 3.33$ hours

14. (a) $\dfrac{x}{\sqrt{x^2+1}}$

    (b) $\dfrac{1-x^2}{x^2+1}$

15. (a) 1

    (b) ∞

    (c) 0

    (d) 0

    (e) ∞

    (f) e^{-3}

16. (a) $-1/8$

    (b) $x^3 \sin t + 3t^2 \cos t - 6t \sin t - 6 \cos t + c$

    (c) $\dfrac{1}{2}(e^x \sin x - e^x \cos x) + c$

17. $\dfrac{2}{3(x+2)} + \dfrac{1}{3(x-1)}$

18. $\dfrac{Ax+B}{x^2} + \dfrac{Cx+D}{x^2+2} + \dfrac{Ex+F}{(x^2+2)^2} + \dfrac{G}{x-3}$

19. (a) $\ln\left|\dfrac{\sqrt{9+x^2}}{3} + \dfrac{x}{3}\right| + c$

    (b) $\dfrac{\pi}{8}$

    (c) $-\dfrac{\sqrt{x^2-9}}{2x^2} - \dfrac{1}{6}\tan^{-1}\left(\dfrac{3}{\sqrt{x^2-9}}\right) + c$

20. (a) $\dfrac{\pi}{4}$

    (b) $\sin\theta - \dfrac{\sin^3\theta}{3} + c$

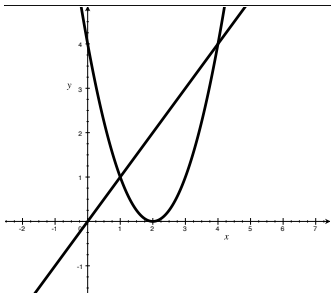
21. (a) 2

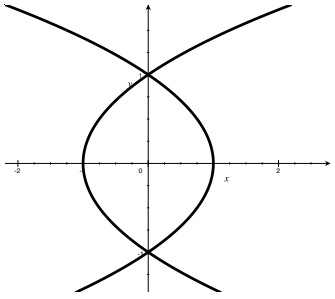
    (b) Diverges

    (c) $-\frac{1}{4}$

    (d) Diverges

22. The population changed (due to births and deaths) by 8868 people over 10 years.

23. (a)  Area $= \dfrac{9}{2}$

    (b)  Area $= \dfrac{8}{3}$

24. $\dfrac{16\pi}{15}$

25. (a) $\pi \int_0^4 \left[(5x - x^2)^2 - x^2\right]\ dx$

(b) $2\pi \int_0^4 x(5x - x^2 - x)\ dx$

(c) $\pi \int_0^4 \left[(5x - x^2 + 1)^2 - (x + 1)^2\right]\ dx$

26. $\int_0^h \frac{1}{2}\left(-\frac{a}{h}y + a\right)^2\ dy = \frac{a^2 h}{6}$